

## REMARKS

Claims 1-11 were pending.

Claims 1-11 are rejected.

Claim 1, 4, 7, 9 and 11 are amended.

Claims 12 and 13 are new.

Claims 1-13 are now pending.

### **New Claims 12 and 13**

Claims 12 and 13 are supported by page 9, last sentence of the penultimate paragraph.

No new matter is added.

### **35 USC 112, second paragraph**

Claims 1-11 are rejected under 35 USC 112, second paragraph as being indefinite. Claim 1 is considered incomplete because it is essential that the instant process include a step for adding the flocculating agent in an effective amount to flocculate the solid biological matter, and a step for separating the flocculated solid biological matter from the aqueous phase.

Claim 4, according to the examiner, also needs at least a step for adding the flocculating agent.

Claims 1 is amended to add a separating step as suggested by the examiner.

As to the examiner's rejection that both claim 1 and claim 4 require a step for adding flocculating agent, the applicant believes the phrase in claim 1:

"characterized by the addition of flocculating agent (s) to the aqueous solids bearing mixture in an effective amount to flocculate the solid biological matter".

and in claim 4

"characterised in that in at least one separation stage in step (ii) a flocculating agent is added to the aqueous mixture in an effective amount to flocculate the solid biological matter."

provide for the necessary addition step. Applicant has amended for clarity as suggest by the examiner the phrase : to flocculate the solid biological matter.

Claims 1 and 4 are further amended to add the phrase "using an acid having a pKa below 4 in a concentration of at least 10% by weight". This is supported by originally filed claims 1 and 4 and page 9, forth paragraph of the specification.

Claims 1 and 4 is further amended to add the descriptor "acid" before "aqueous mixture". There is no literal support for this amendment in the specification. Literal support is not required as long as the amendment is supported by the specification. Applicant refers the examiner to page 2, third paragraph which reads:

"As the hydrolysis preferably is carried out under acidic conditions, the aqueous mixture usually contains the acid applied for the hydrolysis of the polysaccharide based plant derived material."

As acid hydrolysis takes place, the aqueous mixture may be acidic. Thus there is support for this amendment.

No new matter is added.

Thus the applicant believes that the present amendment repairs the 112, second paragraph rejections.

### **35 USC 102(b)**

**Claims 1-3, 7 and 8 are rejected under 35 USC 102(b) as being anticipated by RU 2077594.**

Vyglazov et al. (RU 2077594) describe a method for purification of a hydrolysate of a vegetable material using flocculants, whereby the efficiency of purification is increased within a pH range of 3.0-4.0. The flocculants are introduced into the cooled hydrolysate to form suspended particles, the resulting mixture is then neutralized, followed by separating the suspended solids (cf. Derwent abstract), i.e. the separation is carried out under neutral conditions.

Contrary thereto, according to the present invention the separation is carried out under acidic conditions: the flocculated biological solid matter is separated from an acidic mixture (cf. page 2, 3<sup>rd</sup> paragraph and page 12, last paragraph to page 13, 1<sup>st</sup> paragraph of the present application).

Further, according to page 9, penultimate paragraph, of the present invention, the acids employed according to the present invention are concentrated, i.e. the acid generally has a pKa below 4 and is present in a concentration of at least 10% by weight. Usually though the concentration will be much higher depending on the chosen acid, for instance at least 15 or 20%, but may be considerably higher, for instance between 25 to 90% or even higher, for instance around 70 to 77% if sulphuric acid is chosen, or around 36 to 37% if hydrochloric acid is chosen.

The flocculation step according to claim 1 uses concentrated acid and elevated temperatures, which is evident from page 10, 2<sup>nd</sup>, 4<sup>th</sup> and 5<sup>th</sup> paragraph of the present application. The liquid hydrolysate, already separated from the solid matter, is subjected to a fermentation process wherein the initial low pH of the acidic sugar liquor has to be adjusted to pH 4-5, for example by adding a base.

According to Example I of the present invention "100 parts softwood chips are added to 170 parts of 77% sulphuric acid and the temperature is maintained below 80°C, the resulting gelatinous mixture is thoroughly mixed. Then the gelatinous mixture is diluted with water to an acid concentration of 25%." Clearly, according to the present application the flocculant is added at a pH well below 3-4.

Therefore, Vyglazov does not anticipate subject-matter of claim 1. Furthermore, no hint is given for modifying the process of Vyglazov, in particular applying the flocculating agents to an acidic solids bearing mixture and separating the suspended solids therefrom without neutralizing of the mixture, which would result in the process of claim 1. Therefore, the present claims are unobvious in light of Vyglazov. As claims 2, 3, 7 and 8 depend on claim 1, these claims are also novel and unobvious.

**Claims 1-5 are rejected under 35 USC 102(b) as being anticipated by Brink US 4,384,897.**

Brink (US 4,384,897) relates to a two stage hydrolysis of polysaccharides, wherein ferric and/or aluminum ions are used as flocculants to separate suspended solids from a hydrolysate.

Amended claims 1 and 4 differ from Brink in that the flocculating agents are added to the acidic solids bearing mixture.

However, according to Brink, the flocculation occurs in the neutralization unit 156, i.e. after neutralization of the acid (cf. col. 11, lines 10-12 and 20-42; fig. 4), i.e. the flocculating agents are not added to the acidic solids bearing mixture.

In addition, what is flocculated according to Brink are the solids resulting from neutralization of the acid (cf. col. 11, lines 10-12; col. 5, line 61 to col. 6, line 2) whereas according to the present application the flocculating agents serve to remove the solid residue comprising the direct residue which has not been hydrolyzed (cf. last paragraph on page 7 of the present application).

Therefore, claims 1 and 4 are not anticipated by Brink. Furthermore, no hint is given for modifying the process of Brink, in particular applying the flocculating agents to an acidic solids bearing mixture, which would result in the process of claims 1 and 4. Hence, claims 1 and 4 are unobvious. As claims 2, 3 and 5 depend on claim 1 or 4, resp., these claims are novel and unobvious as well.

### **35 USC 103(a)**

**Claims 9-11 are rejected under 35 USC 103(a) as being unpatentable over RU 2077594 and further in view of Moffett US 6,132,625.**

As discussed above, Vyglazov does not anticipate the claimed process according to claim 1. The combination of Moffett with Vyglazov does not make up for the deficiencies of Vyglazov. Further, it would not be obvious to a skilled person to apply the anionic microparticulates of Moffett to the cooled hydrolysate of Vyglazov. Even if the process of Vyglazov would have been modified by a person skilled in the art using anionic microparticles, one would obtain a process wherein after flocculation the hydrolysate is neutralized and only then, the suspended solids are separated.

Thus applicant believes this rejection is overcome.

**Claim 6 is rejected under 35 USC 103(a) as being unpatentable over Brink as applied above and further in view of Foody, US 6,090,595.**

Foody et al. (US 6,090,595) relates to the pretreatment of cellulose feedstocks for ethanol production, inter alia using enzymatic hydrolysis. Of course, it is generally known in the art to wash a solid after filtration to increase the yield.

However, according to claim 6 of the present application the wash cycle comprises washing the solids and repeating stages (i) and (ii), i.e. hydrolyzing the separated solid comprising still not hydrolysed polysaccharide based plant derived material in an acidic medium, and thereby forming an aqueous mixture comprising dissolved sugar and solid matter, and subjecting the aqueous mixture to one or

more separation stages in which solid matter is removed from the aqueous phase, and optionally using flocculating agents again.

The washing cycle is therefore quite different to simple washing of solids separated by filtration.

As discussed above, Brink does not anticipate claim 4 and, hence, any combination with Brink cannot lead to the present invention. Further, one skilled in the art would not consider the process of Foody, as the hydrolysis is carried out enzymatically which differs from the acidic hydrolysis described by Brink. Even if Brink would employ a simple washing step, one would not arrive at the claimed process.

Hence, claim 6 is also unobvious in light of Brinks in view of Foody.

**Claims 7-11 are rejected under 35 USC 103(a) as being unpatentable over Brink and further in view of Moffett US 6, 132,625.**

There is no direction for one skilled in the art to modify the process of Brink by replacing the ferric and aluminum salts used as flocculants by the anionic colloids and cationic polymers of Moffett, because the flocculants of Moffett would not fulfill the additional function of the ferric and aluminum salts of Brink, i.e. the catalyst function (cf. col. 2, lines 1-5), and further, they would not be recycled.

In addition, the combination of Brink and Moffett does not result in the claimed invention, because the used flocculants would be applied to the neutralized mixture and not to an acidic solids bearing mixture.

Hence, claims 7 to 11 are also unobvious in light of Brink and Moffett.

### **Double Patenting Rejections**

Claims 1-11 are provisionally rejected on the ground of nonstatutory obviousness type double patenting as being unpatentable over claims 1-21 of copending 10/523,230 of claims 1-22 of 10/523,302.

Applicant respectfully request that it makes more sense to wait and submit a terminal disclaimer once all the other rejections are addressed. At that point applicant and examiner will know the final state

and limitations of the claims and the double patenting rejection may be looked at again to determine appropriateness of the rejection.

Reconsideration and withdrawal of the rejection of claims 1-13 is respectfully solicited in light of the remarks and amendments *supra*.

Since there are no other grounds of objection or rejection, passage of this application to issue with claims 1-13 is earnestly solicited.

Applicants submit that the present application is in condition for allowance. In the event that minor amendments will further prosecution, Applicants request that the examiner contact the undersigned representative.

Respectfully submitted,



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